

Dave Asprey:

I worry about all the people who are kind of going, "Oh my God. I'm going to die. I can't fly. I can't do anything." When the reality is that you're infected with all sorts of stuff you don't know about right now, and you're walking around just fine, but how do you build systemic resilience? I didn't understand the connection until you explained it right now between different species of gut bacteria and your ability to resist a viral infection because the gut bacteria is signaling to the body, hey, watch out, that one's infected. That's really cool knowledge.

Announcer:

Bulletproof Radio, a state of high performance.

Dave:

You're listening to Bulletproof radio with Dave Asprey. Today's cool fact of the day, oh, it's about honeybees, specifically engineering gut bacteria in honeybees. Now you're asking yourself, Dave, what the heck are you talking about? Well, new research that came out in Science Magazine shows that we can actually engineer gut microbes to protect honeybees from all the bad stuff happening to them. They made microbes that lure predators like viruses and these mites that suck fat into destroying themselves and thus protecting the honeybees. This is a bacteria called, get this Snodgrassella bacteria. That name is why I had to do this cool fact of that day by the way. I want to call someone a Snodgrassella sometime and see if they punch me or not.

Dave:

Anyway, it's common and bee guts, rod shaped and those molecules are proactive in fighting the tenacity of the gene activity of a virus or a mite, which is super crazy because you wouldn't really think about RNA interference from a gut bacteria, much less one that we actually design versus one from nature. In this research, we're just looking for ways to fight the varroa mite which is decimating wild honeybee populations in wild non-honeybee populations and it's spread by commercial beekeeping. I would just like to point out that if you believe that eating a plant-based diet is protecting the planet, you are killing wild honeybees everywhere with your insistence on plants. You should be eating animals. Come on here. Okay, sorry. Side effect.

Dave:

Just saying it's a complex world out there and we've got to manage our environment carefully so that the environment itself is healthy just like we are healthy and we've got to pay attention to all parts of the system. Anyway, what they found is if they gave this custom made, call it a probiotic for bees, to the bees, mites were 70% more likely to die within 10 days when they ate bees that engineered or that had engineered gut microbes, and bees that had the protective bacteria were 37% higher in survival rate after being exposed to the deformed winged virus. These are massive improvement numbers.

Dave:

What do you know? Do you think in your future you might have custom made probiotics that make you more resilient to things like that? You guys want a really bad joke? What goes best with coronavirus?

Kiran Krishnan:

What?

Dave:

Lyme disease. Too soon? too soon?

Tina Anderson:

Too soon.

Kiran:

Never too soon, in my opinion.

Dave:

I can't believe I just said that. I'm a bad person. I've got to say. Now, if you're asking yourself what the heck? Bees, honey, vegans, what the heck is Dave going to talk about? None of the above, I tricked you. Probiotics, if you guessed that, all right, that was a pretty good one, although maybe that was easy. We are going to talk, not just about probiotics but specifically about some very interesting research that's coming out about the microbiome and about certain types of probiotics that forms spores. The guest today were catalysts for my favorite Bulletproof Radio podcast title ever. Check this out, Armor-Plated Immortal Probiotics from Space. That was episode number 629. These are guests from Just Thrive Health, Tina Anderson and Kiran Krishnan. Guys, welcome to the show.

Tina:

Thanks Dave.

Dave:

Thank you for having us.

Tina:

Excited to be here.

Dave:

More accurately, welcome back to the show. Now, Just Thrive makes, as you might have guessed, an Armor-Plated Immortal Probiotic, one that you can actually bake in the oven that still will grow in your gut, which is really cool. I was blown away by some of the research in the first one. I asked them to come back on the show today to talk about new research and new developments in the field. I think you guys are going to be blown away when you hear some of the stuff we're going to talk about, which go far beyond just what's going on in your gut, but into the world around you.

Dave:

Now, Tina, if people haven't heard the first one, you're a former attorney and you said, I'm going to move into natural health and make a probiotic company. Kiran, you're a research microbiologist and you know a lot about commensal spore bacteria so we can have the business change the world perspective and then the ...

Kiran:

And the super nerd.

Dave:

The super nerd. You can tell by how they're dressed if you're watching on YouTube. Nerd, former attorney, entrepreneur and someone who cares a lot. Okay, so Tina, you got started because of a prescription drug problem. Walk listeners through what happened and just what made you decide to stop being an attorney and start being a gut bacteria hacker?

Tina:

Right. Well, I was in the pharmaceutical industry with my husband and we saw a lot of the abuses going on in the pharmaceutical industry. One specific example was we had won a big bid for a cholesterol drug at one of the largest hospital systems in the country. The drug rep came into our office and he's high fiving my husband like, "This is great. We just won this huge bid. Now my job is to go to every doctor in this hospital system and lower the number that they prescribe cholesterol meds." We were like, "You're kidding me." A part of us was shocked. The other part of us started thinking, we see this with our relatives. We had an aunt who was on one prescription and then next thing you know, she was on 12 different medications and not getting better.

Tina:

One prescription caused one issue. She took something for stomach issues and then she has joint pain, then she's got skin issues and nobody seems to get better. We were like, we're not doing our life's work. We just weren't doing our life's work. We left our roles in the pharmaceutical industry and a very successful pharmaceutical business in order to do something that really meant something to us and to really bring health and wellness to the world out there.

Dave:

Did the pharmaceutical industry put a hit out on you?

Tina:

No, they have not yet.

Kiran:

She's very elusive though, they might be, but she's ...

Tina:

I don't mention the name of the ...

Dave:

I noticed the uncomfortable bulge right there. Now, in more seriousness, when people move from big pharma over to the supplement or the more natural side of things, it is seen as a competitive threat. There's a long history of big pharma buying nutraceutical companies just to shut them down because it competes with things. Did you get a lot of negative, what's the word I'm looking for? A lot of shade from the pharmaceutical business when you went over to the dark side.

Tina:

Not really. We really didn't see that much of impact from it. Yeah, we just left.

Dave:

People didn't like block your number from their phone.

Tina:

Yeah, no, no, no.

Dave:

No like chain smoking in a van outside your house. Nothing?

Tina:

No, not yet. I shouldn't say no. Not yet.

Dave:

Give yourself time as you become more successful Just Thrive, and they're like these darn probiotics, they're taking away our market share. All right. That was how you got into it. We've all seen differences, and from changing going back to it, I think anyone who's listening to this show who's just played around with prebiotics, probiotics. We're recording this live together here at the 40 Years of Zen facility up in Seattle where I do neurofeedback, is a company started a while ago and it's fascinating. So, I'm sitting down, we have five people going through the training this week. I mentioned to them this morning, we're having Bulletproof Coffee. I said, "Hey, I'm doing a podcast with the folks from Just Thrive." One of the ladies there goes, "Oh my God, tell them I love them."

Tina:

Oh my God. That's awesome.

Dave:

I go, "Why? What happened?" She said, "I heard the first episode with them and I tried the Just Thrive probiotic on my daughter who has eczema." She says, it was funny because it happened in five minutes. I told you we were in a room with her. She goes, "We've been to every doctor, we had all these steroid creams and they just told me she'll be on creams forever." That when she started taking the Just Thrive probiotic that the eczema went away. She said, "They fixed her and nothing else would work." So, she's like, "This relatively inexpensive bottle of probiotics replaced what all the doctors couldn't do." That must feel good because that's the sort of stuff ...

Tina:

Yeah. Now you why we love the pharmaceutical industry. It's like this is why we do it. These stories never get old and we get so many incredible stories like this all the time.

Dave:

Well, I'm hoping I can get her to step out of brain training and come in and say hi to you guys, because she wants to say thanks.

Kiran:

That'd be awesome.

Tina:

That would be so awesome. It's my favorite part of doing what ...

Kiran:

Yeah. Well, why we do what we do.

Tina:

Right. Exactly.

Dave:

I was really stoked. It's why I do what I do too because it was one episode and I know hundreds of thousands of people here each episode, but just to know that it had an impact, like I felt happy. I thought you'd appreciate that. Okay.

Tina:

Thank you for sharing that. Appreciate that.

Dave:

Now, Kiran, I know what probiotics are. At least I think I do, but can you define what is and isn't a probiotic? Because I feel like, well I've got this good stuff growing in my gut because I fed it, but I didn't take a probiotic. How do you put a box around the word probiotic? What does it really mean?

Kiran:

So, the definition has changed quite a bit over the last few decades. The very first time the word probiotic was used was by two researchers called Lilly and Stillwell in the 1960s. Since then, it's evolved. The World Health Organization calls a probiotic a live beneficial microorganism when administered in adequate doses, confers a health benefit to the host. There's few key things there.

Dave:

When administered, but if it's naturally occurring, not administered, it's not a probiotic?

Kiran:

Then it's not. It's supposed to be used as a therapeutic agent and it's supposed to be live, so that's a really important part. That's the first part of the definition. Then when they say administered in adequate amount, has to confer health benefit to the host, meaning there's a dosing impact on that probiotic. They really think about probiotics as a therapeutic agent.

Dave:

That seems broken on its face because they can grow.

Kiran:

They can grow, right.

Dave:

It's like if you put a couple bad E. coli strains or salmonella strains in your gut, it's not like you have to dose with enough of them because they replicate quickly. Don't probiotics do the same thing in the gut?

Kiran:

It depends on the probiotic. That's a big part of it. If you think about the gut, we've got 100 trillion bacteria sitting in there. Every square millimeter of real estate is taken up. If someone new comes in, they don't have a spot to sit or live and form a colony, they have to fight somebody else out of that real estate to be able to do that. That's one of the reasons why the vast majority of what we call probiotics today just pass right through. They can't compete with their residents.

Dave:

Are they really fighting or are they cooperating? When you make yogurt or kombucha, there's multiple species in there, but I don't think they're in the kombucha like, I'm going to take you down and then one's going to take you down. It seems like there's an inter-species cooperation, like humans and dogs, but no one likes cats anyway. [inaudible 00:11:47]. Humans and dogs and hamsters or something. Is it cooperative or is it really a fight?

Kiran:

It's a cooperative fight actually. It's an interesting thing.

Dave:

They're frenemies.

Kiran:

They're frenemies, they totally are. What's really interesting about microbial ecosystems, including our gut and everywhere else you see microbes, is the amount of competition that exists in that ecosystem, which can be measured through a number of proteins that are produced. We call that the resistome of the ecosystem, if you will. How much resistance and competition the bacteria have with one another denotes the stability of the ecosystem. The higher the competition, the more they fight in a way the more stable the ecosystem is. Because the tendency is for groups of bacteria to just take over and bring down the rest and eliminate the rest, and to some degree, that would throw off the balance of the ecosystem and it would cause a problem.

Kiran:

The more they're fighting and resisting one another, the more balance and stability there is in the ecosystem. That's what's happening in the gut all the time. Now, they also inevitably, support one another because bacteria are amazing evolutionary machines. Every 12, 13 hours, they can change their genotype in a way to adapt to the environment. What happens is bacteria A comes in and bacteria A is really good at breaking down a certain substrate and then they produce a metabolite as a result of that. Bacteria B can start to adapt to feed off of that metabolite. Then they start creating this commensalism, if you will, where one bacteria's waste feeds the other and then that bacteria's waste feeds another and so on. So, they do cooperate, but they compete a lot, so they are frenemies, is a great way of putting it.

Dave:

Okay. So, there's that constant sort of pushing thing.

Kiran:

Yeah.

Dave:

What are the most common strains of probiotics? We've all heard of yogurt, but what are the common ones that people may have heard of or things that you think are relevant and then I want to go into some of the special strains that you work with.

Kiran:

Unique ones.

Dave:

Yeah.

Kiran:

The vast majority of probiotics are made up of lactobacillus, which is a genus, and then this species is a whole bunch of them, acidophilus, reuteri, rhamnosus and so on. Then we have bifidobacteria as well. If you talk to Walgreens or CVS, their number one selling probiotic, they sell hundreds of thousands of bottles a month, is Lactobacillus acidophilus, just a plain \$7 probiotic where they just throw this one bacteria in there and they move a lot of it.

Dave:

Does it actually work to just take one like that?

Kiran:

Yeah, and that's the big question. There's really no studies on that one generic version of Lactobacillus acidophilus having any impact.

Dave:

It may be dead. Right?

Kiran:

It may be dead in the bottle itself. More than likely it is.

Dave:

For seven bucks probably.

Kiran:

Right.

Dave:

You can, nitrogen flush for \$7. I know.

Kiran:

Right. Exactly. It's the cheapest bottle or the cheapest capsule you can absolutely find. More and more what we're coming to understand about probiotics is, if you imagine these bacteria, they're therapeutic agents. They themselves are minuscule in concentration to what we're putting into this ecosystem. Even if you have something that's \$100 billion CFU and people have seen these numbers ...

Dave:

Colony forming units, so the number of little clusters.

Kiran:

Little bacteria cells that are going in, it sounds like a lot, but then you're putting it into a sea of a hundred trillion bacteria.

Dave:

Its drop a spit in the ocean.

Kiran:

Totally. Tiny drop of spit, right? The question is, can that hundred billion, with whatever capabilities they have, actually create a change in the system? More and more, we're seeing that is less impactful than sending in microbes that can actually change the sea, that can make a change in the hundred trillion that are there. That's where probiotics are really going to change things. That's where the bee example comes into picture.

Dave:

I spent at least \$100,000 on probiotics. I'm not joking, but that's a real number because I had really serious gut problems since I was a kid. I was on antibiotics every month for about 15 years. I lived in a basement that had toxic mold. We didn't know that. So, I was constantly getting strep throat, then they finally pulled my tonsils out and I had my first sinus infection, and then a constant sinus infection. So, my gut bacteria was just trashed. By virtue of that, aside from obesity and stuff like that, room clearing gas. I always made sure my dog was around so I could blame the dog. I'm like, "Ah, bad dog."

Kiran:

Yet another benefit of having a dog.

Dave:

By the way, if you suffer from bad gas, my number one piece of advice is get a dog. Anyway, it was a major issue. So, I would take all this stuff, and sometimes you spend your 200 bucks on some special thing and I never saw that big of a difference. But in the last few years, I feel like probiotics have shifted. Also, just understanding that for me, I had to eat enough fiber in the form of vegetables. Now I actually take prebiotics as well. That has made a meaningful shift. But then I had to take the right probiotic that could light the spark. But there had to be fuel for them to eat and that combination was there.

Dave:

Lactobacillus from \$7 capsules, I never felt anything. Others, I felt like I would maybe see a little difference, but only if I was taking a lot of them continuously. They wouldn't move in and make a

change. But then, I have been taking the Just Thrive. I'm a fan of the spore formers. Tell me about the strain that you guys commercialize, the Dr. Simon Cutting stuff and why that strain, why is it different?

Tina:

Oh, so it's a spore-based probiotic like you had mentioned. The spores actually, they create this endospore shell around themselves like an armor like shell. That allows them to get through the gastric system 100% alive. Then once they get to the intestines, that's when they take their shell off and they go into their live vegetative cell state. We know that we need a live microorganism. So, people think, oh, it needs to be alive in the refrigerator. Well, no, it needs to be alive when it hits your intestines. A lot of times when it's live in the refrigerator, it actually means it can't even withstand the room temperature of the store shelf, so then how would it ever survive your body temperature, which is 98.6?

Tina:

The spore-based probiotics actually are dormant when they're in the bottle and they're dormant when you swallow them and they go through the gastric system and it's not till they hit the intestines that they take their shell off and it become alive organisms. Then they go and read the microbial environment and are actually ... they stay there for about 21 to 28 days.

Dave:

They stay in the gut?

Tina:

They stay in the gut.

Dave:

Okay.

Kiran:

To add to what Tina said, what really fascinated us about spores to begin with is that, they've been used in the prescription drug industry since 1952 in Europe and Latin America as a way of treating gut infections. They have this specificity to be able to go in, do something called quorum sensing, so reading the microbial environment. So, every bacteria spits out a chemical signature. They can read those signatures. They have it in their genetics to identify microbes in our gut that are potential problems. So, they'll find the dysentery causing microbes. They'll find the microbes that are causing you the diarrhea and the infections. They'll sit next to them and then they'll produce antibiotics in that little microenvironment to kill off those bacteria. They've been used in that way as a prescription product since 1952. So, our thinking was, okay, if they-

Dave:

You said spore formers have that?

Kiran:

Spore formers. Yeah. Sanofi-Aventis, a major pharma company launched the spore former drug called, there was two, there's Bactisubtil and Eenterogermina, which is still on the market today. Both used to treat gut infections instead of antibiotics. It's precision anti-microbial activity because it doesn't harm

any of the other good bacteria. It's only targeting the bad bacteria. And spores can do that. Then our thinking was, if it can find and bring down the growth of bad bacteria, can it improve the growth of good bacteria? That was our hypothesis into which we jumped knee deep into the spores. Sure enough, we've seen that it can.

Dave:

You said something fascinating there about quorum sensing. I'm going to go on a little rant about quorum sensing for a second here. If you've listened to Bulletproof Radio for a while, you probably heard the interview with Leemon Baird. He's a Carnegie Mellon computer science professor who invented a hash graph, which is one of the ways we can detect a quorum on Bitcoin, essentially on any of the crypto platforms. What does that have to do with what we're talking about? Turns out mitochondrial quorum sensing is a massive thing and all this is democracy in action. It says, okay, if people are voting, how are they voting? What do we believe? What's the environment? How do we sense the environment around us and how do we know what's happening and what to do next?

Dave:

The algorithm for quorum sensing that bacteria use is almost certainly the same as the one that our mitochondria use. We understand how they send signals, but I think Leemon in his work on crypto actually figured out the algorithm that we use within our gut bacteria and within our onboard bacteria, the mitochondria. Which is that if you have only a third of what's going on, you can determine essentially what people are voting for or not voting for. This idea of quorum sensing is it's incredibly important for systems biology and almost no one talks about it. The idea is how do I know the world around me? How do I know what my peers want and how they're not how I fit best into my community?

Dave:

In the Bulletproof teachings, from my work on mitochondria, I have these four F words. Do you guys know the four F words? I'll go through them real quick for listeners who haven't heard any on this before. The first one is fear. So, any life from whether you're a bacteria in the gut, to your point about how they behave in the gut or a zebra or a human or a jellyfish, it doesn't matter. Number one, run away from kill or hide from scary things. That's fear, right? This is also why we're at 40 Years of Zen because our ability to recognize things that are actually going to kill us versus things that we think will kill us isn't very good as humans. So, you have to go through and reset your fear triggers. Okay, so that's fear.

Dave:

Second one is food, because bacteria have all died from a lack of food and humans, in our history, there's been famines and every animal does that. We think about what's going to kill us now, we think about what's for lunch. It's very normal, and this is also why bacteria will grow as long as there's as much food because there might not be food tomorrow. Then the third thing is how do I reproduce? That's the third F word, right? Then the fourth F word is friend. By the way, the third F word was fertility. I know what you guys were thinking.

Kiran:

Tina was the only one giggling so we know what she was thinking.

Dave:

Tina, what were you thinking, Tina? Are you blushing, Tina? Oh my goodness, I'm shocked and offended. Actually, I'm not shocked. I'm just offended. Then the fourth F word is friend. That's where quorum sensing comes in. Saying, oh, how do I work not just with my own species, but how do I work with other species? In the context of being human, how do we work with our agricultural species of plants that we work with? How do we work with agriculture animals and companion animals and other humans and things that we haven't thought of, like bees or dragonflies or whatever else? How do we interact with the world around us? If our quorum sensing is good, then we're going to be a part of the environment. If our quorum sensing is bad, then we're going to do crappy things like dump plastic in the ocean, put glyphosate all over our soil, destroy the soil, which is the microbiome of the planet that reflects ... It's because bad at sensing threats in our environment and we're bad at sensing other life.

Dave:

That's my little mini lecture on quorum sensing, but how awesome it is that you bring that up in the gut context. I add the Just Thrive, the Dr. Simon Cutting, his strain, the one that you guys work with, I add it to my gut bacteria. What happens with quorum sensing? Is it going to raise his hand and be like, my vote's bigger than yours? Give me some biology here.

Kiran:

What's super interesting about this, and we published a paper on this in August of last year, what we're finding out is the diversity in the microbiome, which is measured by the richness, meaning how many different microbes there are, and then the uniformity within the microbiome as well. Because again, we want to balance ecosystem, right? What we're finding is when you add the spores into the system, the diversity increases by about 30% to 40%.

Dave:

So, you add one species and many other species will pop up as a result of that.

Kiran:

Will pop up. Yeah, which is cool. Insane when you think about it. Some of these ...

Dave:

Doesn't that make the Just Thrive ... it's not really just a probiotic because if it's feeding other ones, it makes it a prebiotic and a probiotic even though you don't have traditional fiber in it.

Kiran:

Exactly, and post-biotic as well, because it also produces a number of critical compounds that then support the rest of the microbiome. In a way is called a keystone strain. Keystone strains or keystone species in an ecosystem are ones that bring balance to the ecosystem and really facilitate this stability within the ecosystem. When you hurt the keystone species or the apex predator, as we would call it in some ecological terms, the whole thing falls apart. What's so interesting about it is we don't have a way to do this ourselves. We don't have an endogenous way of bringing about balance in our microbiome. Our immune system can't go through our microbiome and go, these guys are overgrown, these guys are undergrown, let's bring back balance.

Kiran:

We've outsourced this service to microbes that are in our environment, like the spores. That was one of the things that was so fascinating to us about it is we also know then the type of change that they create actually has a huge impact on overall health.

Dave:

In Super Human my anti-aging book, I read about some bizarre strains of bacteria, one that I started taking. It makes a spermidine. Spermidine comes from, at least it was discovered in exactly what you think it was discovered in. This is the reason that people say that semen has anti-aging properties on topically.

Kiran:

It actually does. It's worth a try for sure. It's worth a try.

Dave:

I didn't say that. Guys, I apologize for my guests lack of taste.

Kiran:

It's a science experiment.

Dave:

In terms of an oral dose, I'm like, I'm not going there, but there's a bacteria that makes it. It's only found in Japan and the label isn't in English, but I'm okay, I'm weird. I order stuff. If I do something like that and very function specific probiotics, but I've used Just Thrive to condition the level of diversity, will it allow other probiotics to survive better if I have Just Thrive as a keystone species? I've never thought about this before, but it's an interesting ...

Kiran:

Yeah, absolutely. Because we're bringing about balance and this really healthy competitive forces within the microbiome, it gives every species that's coming in that could be beneficial a chance.

Dave:

So, you're a probiotic enabler?

Kiran:

Exactly. Yeah, exactly.

Tina:

I like that.

Kiran:

It also translates into things like fermented foods and other foods that you might eat. Because you end up with more diversity, you actually end up with the ability to assimilate and take in more nutrients from all the various foods that you consume.

Tina:

Okay. That makes so much sense. Talk to me about what probiotics do for viruses in the human body.

Kiran:

Yeah. There's the virome in the human body, which is of course your microbiota, if you will, for the viruses. There are lots of latent viruses and most of us have been exposed to Epstein-Barr, cytomegalovirus, herpes simplex, papilloma virus. Most of them have them all of our body, most of us do.

Tina:

Gross.

Kiran:

Yeah. Even in our Cerebrospinal fluid. In fact, there was a couple of studies I looked at, the population of microbes in the cerebrospinal fluid and it's loaded with herpes and papillomavirus in most people.

Dave:

Isn't it crazy we think it's all sterile but it's not.

Kiran:

Nothing is sterile in the body. Nothing. What's so interesting about bacteria and viruses of course, there's competition, then there's the whole phage area where these are viruses specific for bacteria, but viruses are unique in that they don't have any replication capability of themselves, so they hijacked our cellular mechanism to replicate themselves. Bacteria support our immune system and helping detect viruses. They provide clues to our immune system to figure out how to detect, not only a virus, but a cell that's now infected by a virus. Because imagine our immune system comes across an immune cell or a tissue cell that's now infected with a virus, but on the outside of the cell, it looks like our own tissue, so, it can't really detect that that cell has been infected.

Kiran:

We've got bacteria, like one of the things that the spores do is they will flag our own cells that are infected with viruses so that our immune system can recognize them.

Dave:

The Just Thrive spore forming species, and I don't remember its name, it's in my notes here.

Kiran:

Yeah, the bacillus, the bacillus endospores.

Dave:

Okay, bacillus endospores, but the spore forming because they're endospores, okay, so how do they tag an infected, a virus infected cell? What's the mechanism there? That's interesting.

Kiran:

There's something called pattern recognition receptors in the immune system. These are patterns of virus coats of bacterial cell walls that our immune system is supposed to learn over time and start to recognize.

Dave:

The white blood cells do that basically.

Kiran:

Exactly, do that. Now, the upregulation of these receptors, these pattern recognition receptors are done by the commensal bacteria, and certain microbes within the commensal bacteria do a much better job of alerting and upregulating these pattern recognition receptors. So your immune system sees it more visibly. One of the things that the spores do in the system all the time when they're in there is they continuously upregulate these pattern recognition receptors so that if there's any minute change on the outside of cell, there's a remainder of a viral coat, for example, on the outside cell from the virus going in, then your immune system has a better chance of seeing it. They're alerting their immune system much better.

Dave:

Got it. I'm really interested though, because if that's the case, if someone has a healthy balance of gut bacteria, or let's say they're taking the spore formers that are better at this, are they less likely to get a viral infection?

Kiran:

Yeah. The vast majority of people can be protected by most viral infections, of course, outside of really severe things like Ebola, but we know influenza goes, we're still in the flu season right now. Most of us can get exposed to those viruses and never show symptoms. In fact, a big British journal of medicine study showed that the vast majority of people do get the flu and never show symptoms.

Dave:

People are wiggling out like we're destroying the economy right now over coronavirus and the vast majority of people have no symptoms or very mild symptoms. Throughout all of human history, these have been blowing through our populations all the time. We just didn't know about them, so we didn't freak out. A small percentage of people who probably have imbalanced gut bacteria who do not have biological resilience, in other words, they were the sick people already, they were walking sick, they're much more likely to get pneumonia and then the pneumonia may kill them. I worry about the people who are kind of going, "Oh my God, I'm going to die. I can't fly. I can't do anything." When the reality is that you're infected with all sorts of stuff you don't know about right now, and you're walking around just fine, but how do you build systemic resilience?

Dave:

I didn't understand the connection until you explained it right now between different species of gut bacteria and your ability to resist a viral infection because the gut bacteria is signaling to the body, hey, watch out. That one's infected. That's really cool knowledge. I'm very well read. I haven't come across that explained that way, Kiran, so thank you.

Kiran:

Yeah. There are some species of bacteria that act as antigen presenting cells, which is really, in effect, a bonafide immune cell in your system. So you've got bacteria in your system, which the spores are ... some of those types of bacteria that can actually present to your immune system antigens from viruses and other bacteria to teach the immune system what they should be looking for. Then there's a second connection there. One of the other aspects of using probiotics in our gut bacteria to protect us from viral infections, for example, is our macrophages and dendritic cells. They are kind of our immune soldiers that are circulating all throughout our body looking for problematic things. They're in our nose, our brain, everywhere. They are fed by butyrate, by short chain fatty acids. If we don't have adequate butyrate production in our gut, we actually are hindering the development of these really important immune circulators.

Dave:

Butyrate is something that's been fascinating to me forever as part of my journey of fixing my own gut. I found a couple of studies that I published in the Bulletproof diet that said eating butyric acid or butyrate i.e., butter. It's actually named that after butter because that's where they discovered it, that it does anti-inflammatory things in the brain and in the upper gut and then producing it with healthy bacteria, which come from having the right balance and feeding the bacteria of fiber from vegetables or prebiotic fibers and things that, that had a different positive effect. Have you looked into the difference between eating or basically fermented dairy, which we get butyric acid or a little bit from grass fed animal fat, between eating it as a prebiotic as a way to get it in at the top of the track versus just onboard production?

Kiran:

Yeah. The most common way we find butyric acid in our system is from the fermentation that occurs in the large intestine. There's all these transport mechanisms for that butyric acid because the body knows it's being produced way down in the colon. We need to get it into other parts of the body, into to the liver, the pancreas, the kidneys, the brain, so on. And then also the butyrate hones into the fat that's stored around the midsection from that large intestine. Because one of the really important things it does in the fat is that it triggers fat cells to upregulate something called cyclic AMP, which then drives fat burning throughout the bodies.

Dave:

Guess what else does that? Coffee.

Kiran:

Oh yes. Good combination to have the too, right?

Dave:

It's interesting too, that butyric acid is highly ketogenic. Caprylic acid, i.e., brain octane is very ketogenic and butyric acid isn't quite as ketogenic as that, but it's that way. Caffeine is also ketogenic. So the idea is wait a minute, I put butyric acid in there, I have the healthy gut bacteria balance that raises my ability to make onboard butyric acid and all of a sudden, like you've got a little boost of ketones, but the cyclic AMP thing gives you more energy. Right?

Kiran:

It does. Yeah. What's interesting about the caprylic acid side of it is, so then the cyclic AMP signal that's turned on by the presence of butyric acid will actually prime your cells to go, hey, start burning fat for fuel instead of sugar. Caprylic acid then tells your cells start absorbing more fat. So, it's actually helps the transportation of fat into the cell, and then the signal for burning the fat is there as well from the butyric acid. So the combination is really quite powerful.

Dave:

Okay. To translate this into something we could do as someone listening to the show, all right, to get more butyric acid, you want a diversity of species. So, I'm going to say the Just Thrive spore formers. Actually, I take it after that immortal armor-plated stuff. How can I not? There's that, there's prebiotic fiber, which we know can turn into butyric acid. Most people don't know this, but there are species of bacteria that convert collagen into butyric acid. Even if you're on the Carnivore Diet, and Jim and Saladino was on a while ago talking about that, you still can do that. In fact, they just carved that species in cheetahs, which is kind of cool. Who would've thought, right? So you can get fiber from animals. I'm going through my list of things that I would do to do this. What am I missing on that list? So prebiotics and probiotics. What else?

Kiran:

Believe it or not, fasting.

Dave:

How does that increase butyric acid production?

Kiran:

Fasting actually increases the diversity of the microbiome and fasting costs nothing. In fact, it costs you less money because you're not really eating.

Tina:

Yeah. Right, and time.

Kiran:

And time. What's interesting about fasting when you look at it, is it increases the diversity of the microbiome, and specifically it increases the growth of bacteria that are prime to produce more butyric acid. So your butyrate producing bacteria increase in growth when you fast.

Dave:

Oh wow. That is something I did not know. I'm working on some detailed research on fasting right now. I got to incorporate that. Very cool. And there are studies on this.

Kiran:

There are studies on this. And then of course, the spores increase the production of butyrate by 50% in three weeks. We've seen that and we've published that last year. Then when you add in an oligosaccharide, so if you have a true symbiotic, which is the compatible combination of probiotic prebiotic, then you're going to increase that butyric acid production from 50% to 150%. We saw that when we added in a prebiotic that we created with the probiotic and that's also in a published study.

Dave:

That is fascinating. Basically what you're ending up with is huge amounts of butyric acid, which is core to healing the gut in general. And butyric acid is also antifungal, if I recall, right?

Kiran:

Yep. It is. And it brings about a balance within the microbiome. That's one of the ways that the spores increase the growth of other bacteria because there are bacteria that also metabolize butyric acid as a primary fuel source, and if they're not getting adequate butyric acid, their populations are going to go down inevitably.

Dave:

If we translate this, you're listening to the show, don't eat food with antibiotics in it, because then the whole system breaks. That means if you're leaving industrial meat, you're a bad person. Because it's bad for the animals, it's bad for the soil, it's bad for the planet, it's bad for you and it's bad for the people around you, and you're going to hear about why it's bad for them in a minute. There is something called the home bacteria cloud. Is that what you call it?

Kiran:

Yeah, I call it the microbiome cloud.

Dave:

Microbiome cloud. Now you've entered the realm of cloud computing. My [inaudible 00:39:14]. This goes back to an article that I ... It was in WIRED probably 10 years ago, and it was one of the best attention grabbing titles I've ever seen for clickbait. And it was, everyone is surrounded by a cloud of poop and fart bacteria. And you're like, gross, but it was research that said they could actually identify who you were even two hours after you left a room just by sequencing all the stuff in the air. Talk to me about the biome in our homes and what that does to what's in our gut and the people around us.

Kiran:

Yeah, the microbiome cloud. There's a whole series of evidence that there's a huge impact from your health based on the microbiome cloud around you. Some of the studies were studies that showed that households that have dogs tend to have kids with lower incident rates of asthma and viral infections because dogs kind of go out and bring in a bunch of bacteria into your system.

Dave:

The uglier the dog, the healthier [inaudible 00:40:15].

Kiran:

Exactly. Right.

Dave:

My dog's cute.

Kiran:

Then the other studies have shown that households that have more individuals living in it tend to have healthier outcomes for everybody than households that have one or two individuals living in it. The more humans they're sharing microbes have an impact. One of the really interesting impactful studies that really demonstrated this was one done out of Johns Hopkins, published about a year and a half ago. They followed individuals who are starting a course of antibiotics. Before they started the course of antibiotics, they would take stool samples, they would take microbiome samples and then they measured their samples during the course antibiotics and then up to six months after. Sure enough, they found that there was a huge perturbation taking the antibiotic, no surprise there, and then the perturbation lasted up to six months after stopping the antibiotics.

Kiran:

But then they also followed the microbiomes of individuals that lived in the same household who are not taking the antibiotic and they found a very similar perturbation in those individuals even though they weren't taking the antibiotic.

Dave:

That is scary.

Kiran:

It's crazy when you think about it.

Dave:

There's also studies that show that if you spend a lot of time, if you have a lot of fat friends, you're more likely to be fat.

Kiran:

Totally.

Dave:

The presumed cause, this is why science, epidemiology, just looking at, not looking at cause, but looking at correlation is annoying. Because we go, oh, well the cause is very clearly. Well you have fat friends that eat too much pizza. As a former 300 pound guy, I was valued if I didn't eat too much pizza, but there was something else going on. We also know that there's certain kinds of chicken, either bacteria or virus, I think it's a virus that causes you to be obese no matter what you eat. What may be happening here is not that, oh, your fat friends have bad habits. In other words, blame the fatty. Not okay, because it is not a willpower issue. And oftentimes it's not behavioral. Sometimes it is emotional eating, whatever, but it actually may just be that, okay, your gut bacteria is broken.

Dave:

Then, if you're hanging around with a bunch of friends who also have broken gut bacteria, yours may become broken because they're going to sync up. It reminds me of when women in a sorority together, their cycles will sync.

Kiran:

They match up. Right, yeah.

Dave:

Are you telling me our poop is matching because I'm interviewing you right now?

Kiran:

Yeah.

Dave:

You're lucky.

Kiran:

Totally. Yes. I'm Very happy to be getting your cloud.

Dave:

I have the most expensive poop in the room.

Tina:

I'd like to get closer to you over here.

Kiran:

Yeah, no it's absolutely true, that we share microbes in so many ways that we don't even realize. The poop and fart thing, just farting of course sends out a whole bunch of [inaudible 00:42:45].

Dave:

Sorry about that.

Kiran:

But thank you for the dose. You really just gave us a nice probiotic.

Dave:

I'm teaching my kids to say thanks.

Kiran:

Where's the dog? I thought you had one. Then, the other thing like just look at her toilet for example. When you poop in there, you've got all of this stool, you've got the trillions of bacteria sitting in there, you flush it, it's a vortex. It spins. It's going to aerosolize a bunch of bacteria from your poop. They get sucked into the ventilation system, blown back out through your conditioning. So, we are covering each other with poop and colonic bacteria all the time. If somebody in the house has predominance of dysfunctional colonic bacteria, they can literally spread that to everybody else within the system. And over time, everybody's microbiome can be off.

Dave:

One of the things that I learned about this is that the balance in the gut, and I think we talked about this in the last time we were on the show. It's definitely, there's a fungal component to it. There's a bacterial component to it. There's a viral MFH component and probably some other stuff we don't even know

about. Little miniature leprechauns running around in there and no one's seen them yet, but whatever. We're still learning. This is the universe that I know to work with. We know that bacteria throughout the body, if there's a lung biome people don't know. You know there's a sinus biome, there's an eye biome, skin biome. All these different things that we're discovering all the time and I'm blown away by it. But they respond to the world around them. If you're living in a house with toxic mold, and by the way, if you haven't seen Moldy Movie, it's free. I spent a couple hundred grand making the thing and a lot of time, because it just matters so much.

Kiran:

It does.

Dave:

So moldymovie.com. What I found though is that if you have toxic mold in the home biome, the biome cloud around, the bacteria in the body, especially in the sinuses, they'll form biofilms, which is that fourth F-word friend. But they're like, oh, there's a threat. In other words, you've got something in the walls or in the carpet or wherever that's making antibiotics. Then the bacteria go into like aggressive mode, shields up and toxins out essentially, it would be the fear response that they would get. If you have an imbalance there, you can affect what's going on in the sinuses I know, but does that then do quorum sensing or some other sort of signaling then tell the gut bacteria to become more biofilm, forming more toxic?

Kiran:

Yeah. In fact, the communication will go both ways. Disruptions in the gut bacteria can have that same impact in the sinus cavities. Again, all of that is translated through the mucosal system. People don't talk enough about the mucosal system. We're very aware of the skin, our dermal layer and we think that's the largest surface area in the body. The mucosal system is about 150 times larger in surface area and it denotes the true separation between the inside and the outside of the body. Things can go into your system through your nose, through your mouth, through your ears and still be outside of the body technically until it penetrates through the mucosal layer.

Kiran:

So the mucosal layer is the conduit in which all of the microbes and cells and all that communicate with each other, especially immune component to it. So if your gut is dysfunctional and you've got mold toxins being exposed in the gut all the time, you've got an overgrowth of viral components and all that, that translates to the sinus cavities and allows for that type of confirmation in the sinus cavities. Does it go the other way if your sinuses tend to be the first disrupted? Typically, it goes from the gut to the sinuses rather than the sinuses to the gut. So if you've got a dysfunction in the sinus, it more than likely started in the gut.

Dave:

Interesting. It started in the gut and then the gut does get a signal from the environment around it.

Kiran:

Yup. Absolutely. Yeah, it's a biggest area of sampling in the body.

Dave:

One of the things that I'm, I'm really excited about is that my company Homebiotic, one of the companies I've started. People know me for Bulletproof, but there's 40 Years of Zen, there's Homebiotic, there's TrueDark, the glasses. These are, like, no one is doing this, someone has to do it. So then I ended up starting them. We make a probiotic you spray around the house, specifically, not for gut health, although it may do that. I'm going to ask you about that. Specifically to fight toxic mold with ... third party studies that show it blocks toxic mold. I'm interested to know though, now that we're thinking about it, should there be other species? Because, going back to the flushing example, I'm going to assume that I've protected myself.

Dave:

I've taken my spore forming, Just Thrive, so my ability to have a complex and diverse bacteria is amplified. I'm making my butyric acid and I'm getting those benefits. And then I go into the bathroom and some guest dropped a bomb in there. Should there be like a probiotic spray that I'm misting around my bathroom so that I'm getting good stuff? Is this a thing? Should it be a thing?

Kiran:

That's an interesting concept. It could be, now that being said, if you are taking care of the rest of the environment in the house, so the surfaces, the air and so on, the exposure to potentially bad bacteria from one guest who's not taking care of his or herself.

Dave:

You ate an industrial animal and I can smell it.

Kiran:

Exactly. In fact, can help with building resilience because it's good for us to get exposed to certain [crosstalk 00:48:12].

Dave:

It's like exercise.

Kiran:

Exactly. It's like exercise or getting exposure to the cold virus or the flu virus builds some resilience against that. I would say that's not necessarily a problem, but if you have a chronic dysfunction in your home, like you said, if you have constant mold toxins over there, your overall ecosystem is weakened. That allows that one guest's dysfunctional bacteria to actually make more of an impact on you.

Dave:

It's kind of like over-training. [crosstalk 00:48:36].

Kiran:

Exactly.

Dave:

Okay. I get that. Now, you talked about these mucosal surfaces and they translate very remarkably into the recreational areas of the body.

Kiran:

Yeah, absolutely. Yeah. I love that word, recreational areas because they're biologically important, but they're also for play.

Dave:

Exactly. When I say recreational, I'm talking about like your ears. I don't know what you're thinking about.

Kiran:

Tina [crosstalk 00:49:03].

Dave:

Tina, geeze.

Tina:

It's always me.

Dave:

Then you've got your eyes, you're seeing things like that, but there's a mucosal surface there. Then, obviously you can taste food and other things. Then the other mucosal surfaces, which is where I was going with this. You've done some work and you have some research around the vaginal microbiome and what's good for it and what's bad for it. So how do you hack the vagina?

Kiran:

Yeah. For us it's about talking to it.

Dave:

I'm going to [crosstalk 00:49:32].

Kiran:

You have to talk to it.

Tina:

I'm [crosstalk 00:49:34] this one.

Dave:

You have to whisper.

Kiran:

Tina, tell us about your vagina, please.

Dave:

You didn't know [crosstalk 00:49:40].

Tina:

I didn't know that was coming, no.

Kiran:

The vaginal microbiome is maybe the most interesting bacterial culture there is on the body. Most of the body diversity's a really good thing. On the skin, we're finding out more and more diversity's a positive thing, in the gut diversity is paramount to health. Diversity in the gut will dictate how long you live. It has a huge impact on your longevity. Then you come down to the vagina, which is a great place for bacteria to grow. It's moist, it's warm, all of the good things about it and there's lots of bacteria that are being exposed to the area. But a healthy vagina typically is predominated by one bacteria, and that one bacteria, it can be somewhat unique to each woman, but it's typically a lactobacilli, which is a very thing when you look at bacterial culture environments. We talked earlier about how ...

Dave:

That's not a spore former though.

Kiran:

No, it's not a spore former, no. It's a natural occurring commensal bacteria, which can also be found in the gut of most women. So it's typically like a reuteri or gasseri. There's crispatus. Typically, women will have one of those as a predominant bacteria. In 75% of women, a healthy vaginal microbiota means they are predominated by one bacteria. Another 25%, they tend to have higher levels of diversity within the vaginal microbiome, but they also tend to have more issues with BV fertility and all that. And that tends to be found to actually, to some degree, in minority women, which is interesting.

Dave:

So minority women oftentimes have a greater diversity, which is correlated with less reproductive health.

Kiran:

Exactly. Yeah. And a little bit more dysfunction in their vaginal ecosystem. That's what's really interesting about that ecosystem because again, we talked about earlier, anytime you get an area where a lot of bacteria can grow, they form these complex community structures where they bring about balance between species. In this case, it's one bacteria. The thinking behind that is, okay, if it's one bacteria, it's a tenuous system. We can easily screw that up. One of the areas where we're inevitably women get that screwed up is by going to the OB GYN, which you have to go. We're not saying don't go to your OB GYN, but the commercial lubricants that are used in the OB GYN offices have a huge impact on that vaginal microbiota and it creates disruption

Dave:

Because it's like [crosstalk 00:52:03] basically.

Kiran:

Yeah, and all of the lubricants that most people use for their personal life.

Dave:

Like for fun.

Kiran:

For fun. For the recreation inside.

Dave:

Is there a lubricant that's a prebiotic lubricant, chocolate flavor maybe?

Kiran:

Not yet. We are working on one right now.

Dave:

Are you? You really should because that'd be a big deal.

Kiran:

Totally. We're working on one with the idea of not harming the vaginal microbiome because everything else tested so far, harms of vaginal microbiome in some measurable way. The ones in doctor's offices, there's a study going on at University of Maryland where they're looking at intro vaginal ultrasound. These are these probes that go in, they lubricate it. Even a single exposure to that in some women basically devastate the vaginal microbiome and it never recovers again.

Dave:

It's interesting. People may not know this. My first book was about fertility and I did research for that for five years. My wife, Dr. Lana was infertile when I met her and we put together a program of like, hey, if you eat this stuff, and we ended up having our kids at 39 and 42 with no IVF. I paid more attention to the reproductive system and hormones and stuff in the vagina than average. And not just from a recreational perspective, but from a functional perspective. Although, it turns out to get pregnant, you have to do both.

Kiran:

Yeah, which is a good thing.

Dave:

Yeah. I'm not complaining. This is the weirdest interview. Anyway, some women, these are folks who do stuff. Some women will actually do yogurt in the vagina in order to restore, I'm assuming lactobacillus, and of course OB GYN, they're always like, "Oh my God, you're kind of die." And I'm like, most women probably don't die, but they might not like the results. Generally, any validity to this or is it just crazy pants?

Kiran:

No, the problem is it's a completely different type of lactobacillus and you know that's in the yogurt.

Dave:

Got it. Couldn't it act as a signal for the other stuff or a prebiotic for it or is it just a bad idea?

Kiran:

Yeah, I think it could be a bad idea. The problem is there are ...

Dave:

Even if it's Greek yogurt?

Kiran:

Especially Greek yogurt.

Tina:

Now you're talking.

Kiran:

What's really surprising is how conditioned the vaginal microbiome is to what's happening in the gut. One of the things that Cutting is doing is using spore based probiotics as trying to create a natural [crosstalk 00:54:20].

Dave:

Cutting the researcher, okay.

Kiran:

Yeah, Simon Cutting who we got the strains from. What was really interesting about it, cause we talked about earlier how spores can be antigen presenting. They can present antigens to the immune system. So he's doing these studies where he puts like a tetanus antigen on a spore, makes you swallow it and then shows this robust anti-tetanus immune response in the body. Now, he published a study showing with the tetanus antigen. When you take the tetanus antigen, you stick it on a spore, you give it to somebody orally, he did this in women. And then within two hours, you can see anti-tetanus antibodies in the vaginal canal of the women.

Dave:

Wow. That fast.

Kiran:

That fast. It's lightning fast essentially. The antigen that's being presented to the immune system in the gut, then there's an amplification of immune response against that antigen, that response then gets translated to the vaginal microbiome that quickly.

Dave:

I'm starting to feel envy because I don't have a vagina.

Kiran:

It's such a complex area, that vagina.

Dave:

It must be so fun, Tina. I mean like, wow. That leads to the real question. Man, I feel like I'm in seventh grade all the time. I like my mind. Anyway, the question is, okay, there's something else that disrupts the microbial diversity in the vagina and that's called a penis. Isn't there like an equivalent penis bacterial thing? It seems like we're always talking about the vaginal microbiome, in large part, because women get yeast infections, which is really irritating and because, well, they typically have more issues there, but isn't it kind of the penis biome that's a big part of the issues there?

Kiran:

It can be. Well, the problem with the penis is that ...

Dave:

There are many.

Kiran:

There are many problems, right? But one big microbial problem with the penis is, it tends to have skin type of bacteria. So it doesn't say have streptococcus, staphylococcus E. coli on the penis. So, when the penis is in there and it's doing what it's doing, it's introducing those types of bacteria into the woman's vaginal canal, and if the vaginal canal isn't predominated by lactobacillus, and that lactobacillus isn't really strong, it gives an opportunity for that ecosystem to fall apart. Equally, the vagina is also very close to the anus, and that wonderful space in between called a perineum is a highway for colonic bacteria to make their way into the vagina.

Dave:

This is proof that we probably weren't designed by God.

Kiran:

No, exactly right.

Dave:

Because who would push a recreational area and a toxic waste dump right next to each other. It's not right.

Kiran:

It just doesn't make sense. There was no intelligent creation behind this. It just happened.

Tina:

Seventh graders definitely coming out.

Kiran:

Although some people would argue which one is toxic, which one is recreational, but to be fair. The colonic bacteria, the E. coli enterococcus that's coming out of there all the time tend to try to migrate into the vaginal canal. They've got this little highway called the perineum. There's a moist, warm area. It wants to try to get in there. The vagina is essentially between the penis and the anus, and the skin around it is surrounded by microbes that are trying to get into that little utopia.

Dave:

Then before sex, should a guy dip his penis in boiling water or maybe iodine. In other words, do we need to scrub down real good?

Kiran:

It's a good idea to be cleaned a little bit.

Dave:

Yeah. Well, there's cleanliness, but then there's also like ... You can get Betadine, which they use as a presurgical scrub, and that'll kill most things on your skin. I don't think I would enjoy scrubbing myself with it and I'd probably not smell very good. You'd smell like antiseptic. How necessary is it to be like ...?

Kiran:

I wouldn't say it's necessary because we've had millions of years of evolution of penises going in vaginas.

Dave:

It's [inaudible 00:58:23]. Other than the obvious.

Kiran:

Exactly. I think a lot of it is the toxicity that occurs in our gut then translates in our mucosa and then translate to the vagina. Just as that study by Cutting showed that the amplification of immune response in the gut translates so quickly to the vaginal canal, toxicity in the gut can translate very quickly to the vagina canal.

Dave:

So fix the gut, fix the vagina.

Kiran:

Exactly. Yeah. Then don't do things that we know deliberately harmed the vaginal canal, like most personal lubricants do. If you're at the OB GYN offices, ask about alternatives. I've even had women bringing in things like extra Virgin olive oil and saying, "Hey, can you use this instead?"

Dave:

Does it work?

Kiran:

It totally is fine for the lubrication part, for the speculum and going in and doing the exam. What we don't know is if it interferes with the pap smear, so if you're getting a pap smear, that may not be an option.

Dave:

What about for recreational use?

Kiran:

Absolutely. Yeah, it can [crosstalk 00:59:22].

Dave:

It's not right.

Kiran:

It's so healthy. It encourages you to actually get [crosstalk 00:59:28].

Dave:

Mediterranean diet right there. I had to say it. I apologize. Okay. And then, coconut oil, a lot of people like to use coconut oil.

Kiran:

Yeah. Coconut oil can be problematic because it has antimicrobial properties and so it'll likely kill the lactobacilli that are in the vagina. I would caution against it for that purpose.

Dave:

Also, I've seen people treat themselves with tea tree oil, by tea tree also repositories, which is probably going to reduce all the bad stuff, and then hopefully the good self will grow afterwards.

Kiran:

That's the hope. Yeah. Although there's no studies behind it, but that's the thinking.

Dave:

I know some people for whom it works really well. Okay. So I'm just going to go on a limb. I'm asking all the weird biohacker questions. So, if I was a woman and I was going to have sex maybe with a new partner or maybe with a partner who you're just like, I know every time I have sex I itch afterwards or whatever. I'm making this up, having not experienced any of this. Should I like take a culture of my good vaginal bacteria before sex, i.e., my panties.

Kiran:

Preserve it. Yeah.

Dave:

And then throw them in the freezer or something? I'm totally making this up. I don't know if they live in the freezer or not. And then after sex I kind of wash off and then put the good stuff back on so it'll repopulate?

Kiran:

That could work. There's something being developed right now called vaginal microbiome transplants.

Dave:

Right. Like for birth.

Kiran:

For birth and then also for women that suffer from chronic BV where you can actually take transplants from other women who have really healthy vaginal microbiomes and transplanted into women that don't. Same with the fecal transplant. So instead of fecal, we're going vaginal.

Dave:

That's like a natural thing, it's called scissoring.

Kiran:

Exactly. It's supposed to happen.

Dave:

I'm pretty sure that if you look back throughout human history, that that happened naturally in all seriousness because we didn't wash our hands all the time and people do touch themselves at various times. I think that was a natural ... it was just part of the human microbiome in a village or a tent or whatever. I'm going out on a limb there.

Kiran:

That's interesting that you mentioned that it could work. What to me, where my mind goes with that is all of these detergents that we use and sterilization products that we use in our household to continuously clean and sterilize our sheets, our underwear, our surfaces and all that. That can have a negative impact because we're not reintroducing our good microbes to ourselves once we go through a perturbation. For example, like you said, a woman who has healthy discharge in her panties and that contain some of her good bacteria, if after sex she puts that back on, then you're reintroducing some of those good bacteria.

Dave:

So that might be a better practice than putting on just a sterile pair of, just totally a washing machine panties.

Kiran:

Right. Or and laying back in your bed, there's a lot of benefits shown to sleeping naked in the bed obviously. A lot of that is we're dumping a lot of our microbes into that ecosystem and we continuously get that osmosis from those microbes as we lay in there.

Dave:

That's one reason you shouldn't use fabric softener especial on your sheets cause that's going to disrupt all of that.

Kiran:

Yeah.

Dave:

Very fascinating. I hadn't thought of that at all. I'm blown away. Now, you talked a little bit about something else that has me interested. You talked about taking the species that you guys use from Dr. Simon cutting. And then, you said he was putting antigens from tetanus. How's he putting? Is he rubbing it on tetanus? Or how does he put those on there?

Kiran:

There's a way to bind it. The spore is a protein that when it's in the spore form it has a protein coat to it. Most antigens are proteins themselves. So there's a way of binding proteins to proteins. You use these things called ligands and you can attach the protein to protein.

Dave:

Okay. So they're doing it ...

Kiran:

He's actually attaching it.

Dave:

They're doing it in a test tube?

Kiran:

In the test tube. Yeah.

Dave:

Okay. Got it. What is an IgG and how does that work? Because you guys are hacking IgGs. I actually know what they are because some of the things I make are specific to increasing IgG, but you've got a new take on it. So define what an IgG is, how that refers to tetanus and just kind of give me the [inaudible 01:03:37] on this.

Tina:

Yeah. Well, an IgG is an antibody as you know. IgG is one of the most common antibodies that are found in the body. Its job is to bind to toxins and bad bacteria and viruses and other bad stuff in our gut and neutralize them and have them safely removed from the body.

Kiran:

To add to what Tina is saying, the way we even came across this with the whole concept of utilizing IgG for gut health, is we were part of a small consortium of companies that were working with HIV researchers to study what we can do about something called HIV Enteropathy, so the NIH published a study, I think it was 2014 that showed that the best predictor of mortality in HIV and AIDS patients was the degree of leakiness in their gut, and they call it HIV Enteropathy because what tends to happen in that condition is you start getting all of this mucosal inflammation, gut lining damage, and then you develop the opportunistic infections that come along. In fact, the progression from HIV to AIDS is dictated by how leaky that gut is.

Dave:

Wow.

Kiran:

Then, the NIH actually propose a challenge to the research community and said, if you can find a solution for HIV Enteropathy we could probably significantly reduce the pathogenesis of the disease, how fast it progresses, the mortality rate, and so on. There were a couple of companies, including ourselves, that have things that are therapeutic in the gut, that work on the lining of the gut, the barrier function. We met this company that has this immunoglobulin product, and at that point they had two published studies in HIV patients showing that when you take bovine immunoglobulins, which is coming from the bovine serum, so cow serum, and you introduce it orally into HIV patients, you actually reestablish the formation of the mucosa lining. You bring down inflammatory response in the gut lining, even in HIV, which is an accelerated form of leaky gut. And then it allows for the repair of the gut lining.

Dave:

People oftentimes are grossed out bovine serum albumin. Actually, that comes from cow blood, doesn't it? Yes, it does. Most people have never heard of this unless you're like a long-time Bulletproof fan. The first whey protein that I formulated eight, 10 years ago, whenever that was, it was 20% bovine serum albumin for specifically getting IgGs into the body. It was also a special kind of way and it had some MCT powder in it. Pro athletes were taking it and going, "Oh my God, what's in here? This is amazing." But bovine serum albumin, it's hard to get and vary in quality, so I ended up switching to colostrum. A lot of people have heard of that. That's mother's milk and that's also high in IgG.

Dave:

So the first two days after we have kids, or after any animal has babies, any nursing animal, it makes very high IgG as a way to get this signal into the body. And then after two days, the milk turns into normal milk, which still has IgGs. Right?

Kiran:

Yeah.

Dave:

What are you doing with your new IgG? I don't want to call it hacking. You've got a new IgG product that's different than the spore forming Just Thrive probiotics, but works with it. What I don't understand is how they work together, so walk me through your thinking behind it.

Kiran:

Yeah. That's a great question. So, we think of the IgG as really intelligent drones, if you will. If you've got a battleground, which is the gut, which is always a battle ground and you've got toxic things in there, like viruses, bacteria, mold, mold toxin, as you described earlier, those things are continuously driving inflammatory responses, and inflammatory responses actually have a negative effect on the microbiome population. Chronic inflammation actually brings down diversity in the microbiome, and in part, because inflammation supports the growth of opportunistic pathogens. We're thinking a two-step approach then to healing the gut. We're sending the spores in there that are going to start modulating the population of bacteria within the gut.

Kiran:

They're going to start increasing the production of things like butyrate, short chain fatty acids, would help the rest of the population. But really to accelerate the healing process, we need to also damp and all of the toxic effect that's going on in the gut. IgG being these intelligent drones that you can send in that go around and find the mold toxin, find the bacterial particles, find the C. diff toxin. They neutralize all of these things that are driving the inflammatory process in the gut and get rid of them.

Dave:

IgGs do that if you get enough of them in. So what is the Just Thrive IgG, like you have ultimate IgG. It's a new thing you guys made. What is it doing?

Tina:

Well, it's also dairy free, which is a great advantage and it has more IgG than you would find in most colostrum.

Dave:

Okay, and so this is a bovine ...

Kiran:

53% IgG.

Dave:

So this is basically a powdered supplement element bovine serum element essentially?

Kiran:

Yeah.

Dave:

Awesome. By the way, we're not doing the whey protein, that [crosstalk 01:08:38]. Just because I've focused really heavily on collagen and you can only have so many products before your brain explodes. But I'm just saying that the BSA, the research is insane.

Kiran:

It is. Yeah.

Dave:

It's just an unknown thing in the world, even with biohacking. Bodybuilders in the '80s looked at it, but in terms of restoring gut, I think you guys are onto something very potent there.

Tina:

Yeah, I think one of the things I just wanted to add is, as a company we really try to bring things to the market that are missing in the market and needed in the market. We obviously have so many times where suppliers are coming up to us, "This is the greatest, this is the greatest product and the greatest ingredient," but we really are trying to find things that are backed by research, backed by science, and

bring them to the market and that are really making a difference in people's lives. That's really important to us.

Dave:

There's two kinds of entrepreneurs. There's the mission driven entrepreneurs, like you and like me. We're like, oh, let's make something you can't buy because the world needs it. Then you get the wantrepreneurs who are saying, "Oh look, that guy made something cool. I'll make the same thing, but I'll do a shitty job. I'll tell everyone it's the same thing and then I'll basically destroy the category with my low cost, nonfunctional copies." I've seen a lot of that.

Kiran:

The me too epidemic in this industry. That's the problem.

Dave:

Pretty soon you have someone with a \$7 non-tested probiotic saying it's the same thing. I get people try to copy what I do with my coffee beans. You can't. It's really hard. They're like, "Oh, we do this sort of thing." Like, no, you don't. That kind of behavior, it doesn't work. So I appreciate you coming out with BSA, but I have a hard question for you, and I did not ask you this ahead of time because I didn't realize you're using BSA, I just knew you were working with IgGs. You guys, this is a sponsored episode because I wanted you guys to come back in and all, but I didn't prep in order to do this. I just want to ask you hard questions. Where does the bovine serum Oberlin [inaudible 01:10:36] come from?

Kiran:

So it comes from the cows and the cows.

Dave:

What kind of cows? Happy cows?

Kiran:

Yes. Very happy cows getting massages and drinking beer. No, in fact, that's really important part of it. It's really, really critical. In fact, a lot of the cows that ... this comes from our New Zealand cows, and globally in general, New Zealand cows are thought to be the healthiest cows.

Dave:

Yeah, a lot of grass fed dairy comes from New Zealand. It's a pretty healthy cow. Number one, that would raise my assessment much higher. That was one of my problems with the BSA I was doing, was I couldn't get sourcing on it. I really don't want to support industrial agriculture in any way or at least industrial animal agriculture because it's evil and there's all sorts of problems. So New Zealand. Okay. And they do tend to eat grass because it's cheaper than grain in New Zealand, just like Irish butter, same thing. Grains expensive, grass was cheap, we did grass. Okay. So you're you're doing that.

Kiran:

Yep.

Dave:

Anything else we should know about the cows?

Kiran:

Ultimately, the cows are cows that are going to end up being meat. They're going to be slaughtered anyway. For those that feel a little bit bad about, maybe ethically you've gone vegetarian if you're listening.

Dave:

I'm sorry. We've got to just stop this. You are unethical if you are a vegan because you are destroying soil on the planet. You're stupid vegetables, eat animal poop, and if you don't come to grips with that, you are simply a traumatized, wobbling lump of nutritionally devoid flesh. I'm sorry. You have to deal with this fact that you cannot eat vegetables without poop. I say this as a farmer. This is what happens when you strip mine the earth to get things to put it in your soil. We have about 40 years of those reserves left. Then, if we don't have regenerative agriculture with cows walking around and crapping on our food, we will not have soil and we will not have food. We have 60 years top soil left. So stop saying ethical ... no, it's unethical to take animals out of agriculture. Like we will die as a species if we do that. We need them.

Dave:

They need us. So pet your cows, treat them well and at least eat the butter. All right, sorry. Back to our regularly scheduled program. I had to get that off my chest.

Kiran:

No. That's absolutely right. That's part of that community structure, the quorum sensing we were talking about.

Dave:

The forth F.

Kiran:

The forth F. Exactly.

Dave:

Friends with the animals.

Kiran:

Exactly. You know. These cows are going to be meat cows eventually. So, it's a byproduct of that. We're utilizing the blood that really typically just gets sent to a random plant.

Dave:

If you're lucky, often times it's sent into rivers. It was considered waste and it has precious molecules that are good for humans [crosstalk 01:13:20]. So you're taking a waste product that might've been pet food and it's turning into something that is fixing people's gut lining and their immune systems.

Kiran:

Highly therapeutic.

Dave:

I feel pretty good about that. That passes my ... is it good for the earth, is it good for the animal, is it good for the human? All those boxes are checked with BSA, but people, it's like, eew, gross blood. At that point we got to talk about the Maasai.

Kiran:

Yeah. I was going to I was going to bring that up myself.

Dave:

Okay. Bring them up.

Kiran:

There's so many cultures. The Maasai are famously known for drinking the cow's blood, the cattle blood, right? It's a warrior thing. It's about the virility it gives them and so on. To a modern culture that looks crazy and gross and all that.

Dave:

They actually blend it in coffee now.

Kiran:

They do?

Dave:

No.

Tina:

Oh, I was like, really?

Dave:

So good.

Tina:

You totally shocked us.

Kiran:

Yeah. We're like, you really did a good job getting the brand everywhere.

Dave:

They're largely living on cow's milk and cow's blood. Especially the men, especially when they're out hunting and things like that, but that is a shockingly high part of their diet and their incidence of disease is low.

Kiran:

Yeah, and albumin, bovine serum albumin is probably the top five used nutrient in scientific research. It's used as a growth factor for every kind of cell you can think of, for bacteria in media and all that. It's so rich in life-giving sustenance that it's so critical for research.

Dave:

It's also naturally free of antibiotic residues because it wouldn't work in research settings otherwise. It would throw things. I don't know what the filtering process, but you probably do for how they're getting albumin that doesn't have residues.

Kiran:

Yeah, and it's very expensive and critical. It's called lyophilizing, so freeze-drying process then purifies it really good.

Dave:

Okay. Now, I feel like I've learned an incredible amount. I didn't think we're going to go into BSA because no one knows about bovine serum albumin, but of course you guys do. We've talked about all sorts of good stuff. Talked about vaginas, most important thing.

Kiran:

Save the vaginas.

Dave:

Recreational areas, right? I'm trying to think, what did we not talk about that's new and cutting edge research that we didn't cover in the last interview and in this one because you're becoming my go-to experts on what's the latest stuff going on with adding stuff to the gut.

Kiran:

Right. One of the things that we're working on right now is the gut mitochondria, the microbiome mitochondria axis, which is an area we love and just as evolutionary biology nerds, you know, and you mentioned this earlier, that the mitochondria use the same kind of quorum sensing as the bacteria in our gut because mitochondria are really ancient bacteria. They're these ancient pleiotropic bacteria that got basically swallowed up by an [inaudible 01:16:14] and then formed this eukaryotic human cell. The needs of the mitochondria are very similar to the needs of the microbes in your gut and is a direct conduit for things that are produced in the microbiome that support our mitochondria. For example, one of the areas that we're really interested in is polyphenols and the conversion of polyphenols, so things like Urolithin, Urolithin is a compound that is absolutely critical to something called mitophagy, which I'm sure we've talked about quite a bit, right?

Dave:

Oh, yeah. I wrote a book about it. It is death of weak mitochondria we're talking about.

Kiran:

Exactly, and cleaning up the damaged mitochondria, and then the mitochondria biogenesis, which is the formation of new mitochondria. That signal for triggering the removal of dysfunctional mitochondria

and bringing about the growth of new mitochondria comes from the gut microbiome. Those bacteria are signaling to their ancient cousins in ourselves that you need to start cleaning up and shifting. Aging is just defined by how many dysfunctional mitochondria we have in our system. A fascinating study that looked at tissue samples of a five-year-old compared to a 90 year old published, this was a Landmark study on tissue pathology.

Kiran:

They sent it to pathologist blinded and said, discern the difference between these two tissues. They didn't know which one was which. The only thing they could find between the two tissues was the 90 year old had 95% dysfunctional mitochondria. Five-Year-Old had 100% functioning mitochondria.

Dave:

It's interesting. One of the guys who's been on the show whose research I sighted really heavily and headstrong, which was my mitochondria science book. She found that 48% of people under age 40 had deficient mitochondria and everyone over age 40 has these. What you're saying though is that by changing your gut bacteria, because of this fourth F-word friend, we want to be friends with other species as well or maybe frenemies. What's going on is, is you can have a healthy gut bacteria that stimulates your mitochondria to get rid of the weak ones and replace them with young ones, which is a preeminent strategy for anti-aging. I also mentioned this in Superhuman, the anti-aging book because it's like, if you understand this and you can say, I don't need to understand the details, I just need to know what to do. Like you said earlier, fasting does magic stuff for mitophagy, it also does magic stuff with your gut bacteria diversity, which again sends a signal like you're describing.

Kiran:

Sends a signal. Exactly, yeah.

Dave:

Then you add in the spore forming bacteria, the stuff you make, Just Thrive, which is going to increase diversity even more, and that diversity, in a different study that you didn't mention, is actually something that can predict your age within four years.

Kiran:

It is. Yeah.

Dave:

I'm guessing you know about that study as well.

Kiran:

Absolutely.

Dave:

Tell me about that study.

Kiran:

Yeah. it's fascinating. And the researchers actually just followed up with a second study that published this month. The first study was about taking microbiome samples and being able to predict someone's chronological age without knowing who they are, what their age is by looking at the ecosystem of their microbiome. And they were able to do it so accurately within four years of their actual chronological age. And then they extrapolate that into predicting your biological age based on that as well. The diversity in your microbiome will dictate how long you live and where you are in your aging process. Then recently, they published a study and said that actually the skin microbiome predicts it even closer than the gut microbiome. Both of them, same correlated with diversity, but the skin microbiome does it even better.

Kiran:

So if you do both, it actually gives you the real definition of how healthy or sick you are. Now, here's the other cool thing about a study out of University Arkansas looking at diversity and longevity. They found that people in their 90s who are living chronic disease free lives and were really healthy when they compare their microbiomes are different age groups, they found that people who are the healthiest in their 90s had a diversity of gut microbiome similar to people in their 30s, because as you said, in your 40s, you start seeing a dysfunction in mitochondria right away. It starts dropping quite a bit each decade. Correlative to that, the microbiome diversity drops quite a bit in your 40s as well. So they kind of go hand in hand.

Kiran:

If you're 90 and you're living a really healthy life and you're not aging the way typical 90 year olds live, your microbiome looks like it did when you were in your 30s.

Dave:

Okay. As our mission driven entrepreneur, now I have a question for you.

Tina:

Okay.

Dave:

All right. We know that there's a company out there that does young blood transfusions from college students, where you take their blood and you pull out their serum, which has anti-aging compounds in it, and by the way, I named the antigen compounds that you can synthesize anyway in Superhuman, and then you inject them in someone else. If they didn't have clinical studies, they shut it down. Now, would you consider creating a young poop line where you could get poop from young people to use fecal matter transplants for older people or maybe make a pill out of it?

Tina:

Well, I think we'd have to, like everything we do is based on science and research. I think we'd want to test it in humans. We wouldn't do anything if it wasn't tested in humans.

Dave:

Would you test it yourself?

Tina:

Probably not.

Dave:

I would.

Kiran:

She's got very young, healthy kids. You can do it yourself at home.

Tina:

Yes, this is true.

Dave:

Where I'm really going with that as A, I hope you would say yes, but B, that is actually the best fecal matter transplant, and by the way, if you're listening to this going, what's a fecal matter transplant? It's what it sounds like. You take someone else's poop and you put it where the poop goes. It's cured all sorts of people have diseases and it's also introduced diseases if you don't get clean poop, but who has the cleanest poop? A one year old who has never taken antibiotics whose mom ate clean food. So, babies are healthier. I could see, I don't know if that'd be a Just Thrive thing or some other company that you might start, but honestly, if you can capture those species and you can make it so that older people can take them, there are UK based companies who are taking human poop species, putting them in capsules that you can take.

Kiran:

Yeah, there are poop pills in the market now.

Tina:

I'm just wondering about lasting effect of it, that's what we'd have to find out. Yeah.

Dave:

Would that be the kind of direction that just drive could go? You're doing ...

Tina:

We're cutting edge and we're always bringing things to the market that nobody else knows about and are different that are based in science. So yeah, we're open.

Dave:

So just harvest some of your kid's poop. Just don't tell them. Alan and Anna, I never took your proof, but I'm telling you. Honestly, I hope that you guys will continue being on the very cutting edge, whether or not you decide to do young people's poop pills, white pee, pee, whatever that's called. But I do think what you're doing around your ultimate IgG with bovine serum albumin, it has scientific efficacy. It has a long history. It's unknown and it's very beneficial. So thumbs up. By the way, it's a powder. How does it taste? I didn't [crosstalk 01:23:22].

Kiran:

It's in a capsule.

Dave:

Oh my God, because I never was a fan of the [crosstalk 01:23:26].

Kiran:

No, that can be problematic for people.

Dave:

Yeah. Masking that was tough in the [inaudible 01:23:30] did a while ago. Okay, so pills for helping your gut. I'm actually knowing that you have pills now. I will add that to my giant handful of pills that I take four times a day. That's an easy thing to do.

Kiran:

Yeah, awesome.

Tina:

Easy.

Dave:

Okay. There's that. And knowing that you have the Just Thrive spore forming armor-plated bacteria from outer space. That stuff, I also do take, and I do take other probiotics as well because I believe in having diversity. I do think, like you said, as a keystone species, that's a really good thing. As you evolve your probiotic strategy like that, give me some probiotics that keep me really young. All right. [inaudible 01:24:09].

Tina:

Fair enough.

Dave:

I have to say, I don't want to Just Thrive. I want to just completely kick more ass than driving. Just make me some products. I'll do that. I would appreciate that.

Tina:

Fair enough.

Kiran:

You want a Benjamin button almost that's going backwards.

Dave:

Exactly.

Tina:

Yeah.

Dave:

Exactly.

Kiran:

I love that.

Dave:

To be really clear, just so you know, full disclosure, I also do a prebiotic, one that I've formulated. But if you're listening to this, you're going, "Oh God, what do I take?" Look, eat a ton of vegetables. It's not that hard.

Tina:

Right. We always say that.

Dave:

Have some sushi every now and then. You cook on your cool, your white rice. There's lots of food sources. You can do this without having to buy anything from Just Thrive, without buying anything from Bulletproof. We just make it easier.

Kiran:

Totally. Yeah.

Dave:

That's the idea. I do think that you guys have done a very meaningful job of being on the cutting edge and using stuff that people haven't heard of and stuff that's backed by tons of research, and you, especially on our first interview, you really taught me a few things I hadn't come across, and not a lot of people do that because, like I read stupid ...

Kiran:

Everything.

Dave:

So, it's hard to get the knowledge and it's also hard to start a company and do that stuff. Tina and you guys are obviously partnering effectively and making good stuff.

Tina:

Thank you.

Dave:

To the extent that, randomly, someone at 40 Years at Zen is like, "Oh my God, that fix my daughter's eczema.

Tina:

It's really cool.

Kiran:

It's so fantastic, yeah.

Dave:

As soon as we're done, we'll walk over there and see if she's out of brain training and she could say hi.

Tina:

Yeah, that would be great. I think that's the hardest part, or the thing that people aren't realizing is the effect the microbiome has on virtually every aspect of our overall health. From mental health issues, people don't realize 90% of our serotonin is produced in our gut. People aren't thinking they are having mood swings and all that, that that's actually a reflective of your gut health. It's been great to be able to ... that you have such an awesome platform to people know that.

Dave:

It's definitely changed how I show up in the world. I like not being fat and inflamed and having pimples all the time and smelling bad.

Kiran:

And the dog is happy you're not being blamed for [crosstalk 01:26:15].

Dave:

Yeah. We let him in the house sometime.

Tina:

Right.

Dave:

All right. On that note, the company is Just Thrive and we talked about your probiotics, which are probably called Just Thrive Probiotics.

Tina:

Yeah.

Dave:

There you go. I nailed that one. Then your ultimate IgG is the stuff that feeds your gut mucosa, the bovine serum albumin product. Go to [justthrivehealth.com/dave](https://justthrivehealth.com/dave). Use code Dave 15 then save 15%, just as a way of saying thank you for listening to the show. You guys make good stuff, so thank you.

Tina:

Thank you.

Kiran:

Thank you.